

# Wisconsin WAP Mobile Home Natural Gas Measures List

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**Purpose:** A clearly defined set of measures for the weatherization of manufactured housing (mobile homes) in the State of Wisconsin’s Weatherization Assistance Program (WAP), that will increase the overall cost effectiveness of weatherizing this housing stock.

**Scope:** The Natural Gas Mobile Home Measures list was created based upon data analyzed in the FY14 SIR Analysis, and SES Assessment of Gas, and Electricity Savings for Homes under Wisconsin’s Home Energy Plus Low-Income Weatherization Program, as well as input from the cost-effective weatherization of mobile homes pilot and mobile-home workgroup. The proposed measures list is designed to improve the cost effectiveness and return a savings on the investment at a greater rate than before. The measures list is broken out by therm bins, providing different work scopes based upon pre-weatherization fuel consumption of each home.

## Natural Gas Measures List

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## 1. Energy Audit

An energy audit will consist of a basic walkthrough of the home with minor data collected on the shell, health and safety and mechanicals of the home. An energy auditor shall not test any of the mechanicals or perform diagnostic tests in the home (i. e., furnaces, water heaters, gas leaks, draft tests, blower door, room pressures, and duct leakage). The prescribed list of measures to be completed must follow the rules and guidelines set forth below. Descriptions of an energy auditor's responsibility for some measures are depicted in the measure details below.

## 2. Crew Work

Crew work is limited to the prescribed measures that are selected based upon the energy audit findings and allowable expenditure. Crews shall not test any of the mechanicals or perform diagnostic tests in the home (i. e., furnaces, water heaters, gas leaks, draft tests, blower door, room pressures, and duct leakage) as part of the weatherization project.

## 3. Therm Bins, Available Measures, and Allowable Expenditures per Pre-WX Fuel Consumption Bin

For each level of pre-Weatherization (pre-WX) fuel consumption, an “allowable” expenditure limit is associated with each individual mobile home. Agencies must follow the order of the measures list as prescribed in each therm bin (i.e., agencies cannot advance past a measure to do another measure). Expenses for Baseload measures are excluded from the allowable expenditure amount. For all other measures, expenses are deducted from the allowable expenditure amount. Any Health and Safety work completed is deducted from the allowable expenditure amount. Once an agency reaches the maximum allowable expenditure based upon the pre-WX fuel consumption, an agency must stop. Agencies must calculate their own average costs for major measures, with the exception of Limited Belly Insulation, and Air Sealing (these two measures have cost caps). If an agency costs are unknown, please contact the help desk at [heat@wisconsin.gov](mailto:heat@wisconsin.gov) and DES will help to provide those numbers.

The table below depicts the allowable measures list based upon pre-WX fuel consumption and the expenditure limits associated with each step of therm pre-usage levels. Note: The therm levels are to be read as “up-to” — e.g., the row for 1,000 therms captures homes with 1,000 - 1,099 pre-WX therms. Until the next Therm level is reached, the agency may not move into that expenditure and measure list.

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Annual Pre-WX Therms Usage	Baseload	Furnace Replacement (* Buy Down Option)	Duct Sealing	Air Sealing \$450 Cost Cap	Limited Belly Insulation \$500 Cost Cap	Allowable Expenditure Baseloads Excluded
<=599	✓					\$900
600-699	✓	*	✓	✓	✓	\$1,200
700-799	✓	*	✓	✓	✓	\$1,500
800-899	✓	*	✓	✓	✓	\$1,800
900-999	✓	*	✓	✓	✓	\$2,100
1000-1099	✓	*	✓	✓	✓	\$2,400
1100-1199	✓	✓	✓	✓	✓	\$2,700
1200-1299	✓	✓	✓	✓	✓	\$3,000
1300-1399	✓	✓	✓	✓	✓	\$3,300
1400-1499	✓	✓	✓	✓	✓	\$3,600
1500-1599	✓	✓	✓	✓	✓	\$3,900
1600-1699	✓	✓	✓	✓	✓	\$4,200
1700-1799	✓	✓	✓	✓	✓	\$4,500
1800-1899	✓	✓	✓	✓	✓	\$4,800
1900-1999	✓	✓	✓	✓	✓	\$5,000
>=2000	✓	✓	✓	✓	✓	\$5,000

### 4. Measure Descriptions and Guidelines

#### 4.1 Baseloads

Baseload measures will be completed on every home. Baseload measures include the following items:

- A. Compact Fluorescent Lighting (CFL) bulbs
  - i. To be replaced at time of energy audit. (agency decision)
  - ii. Replace existing incandescent light bulbs that have a daily burn time of 1.5 hours or more with CFLs.
  - iii. Replace halogen torchiere lamps.
- B. Flow Restrictors/Showerheads
  - i. To be replaced at time of energy audit. (agency decision)
  - ii. Replace existing non-low-flow faucet aerators and showerheads with 1.5 gallons per minute (GPM) water-saving devices.

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### C. Refrigerators

- i. Replace a functioning refrigerator manufactured on or before December 31<sup>st</sup>, 2003 is eligible for replacement with a properly sized unit.
- ii. If the existing refrigerator is greater than or equal to 18 cubic feet (CF), the replacement refrigerator should be equal in size.
  - a. If the existing refrigerator is less than 18 CF, upsize to an 18 CF refrigerator if the available refrigerator opening will accommodate the larger size.
- iii. If unsure of the existing refrigerator's age, use the following website to help determine the age: <http://www.kouba-cavallo.com/refmods.htm>.

### D. Freezers

- i. Replace a functioning freezer manufactured on or before December 31<sup>st</sup>, 2003, and greater than or equal to 14 cubic feet, is eligible for replacement with a manual-defrost unit of comparable or smaller size.
  - a. Replacement freezers should be equal in size to the existing freezer.
- ii. If unsure of the existing freezer's age, use the following website to help determine the age: <http://www.kouba-cavallo.com/refmods.htm>.

### E. Water Heater Conversions

- i. Replace existing electric water heaters with natural-gas direct-vent water heaters.
  - a. Prior to replacement the energy auditor must verify that the conversion is feasible.
    1. Flooring and attic structures are not impeding the proper venting.
    2. Enough clearance exists inside closet to allow installation.
    3. The customer agrees to the conversion.
  - b. \$250 maximum allowance above and beyond bid cost allowed for incidental charges
    1. Retrofitting of cabinet for installation of water heater
  - c. Draft testing (worst case and natural conditions) of the newly installed water heater is not required.

### F. CO and Smoke Detectors

- i. To be installed at time of energy audit. (agency decision)
- ii. Install CO Detectors on every mobile home
  - a. If a gas water heater, natural drafting furnace, or draft induced furnace is present in the mobile home attempt to locate the CO detector relatively close to the appliances.
- iii. Install Smoke Detectors if the mobile home has a wood/pellet burning appliance.

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## 4.2 Furnace Replacement

The furnace replacement bid cost must be deducted from the allowable expenditure. The cost of auxiliary work (i.e., condensate pump, thermostat) shall also be included in the deducted cost.

Home Energy Plus Furnace Program clause: If the furnace was replaced through the HE+ Furnace Program within the last 12 months, the invoiced replacement cost shall be deducted from the job's allowable expenditure.

Buy down option: The customer does have the option to buy down the cost of the furnace in the pre-WX therm ranges of 600-1000 therms. The allowable expenditure amount may be used to pay a portion of the furnace cost, if the client agrees to pay the remainder of the cost.

For example, if the home is in the 600 therm range and the total cost of a new furnace is \$2,000 an agency can pay \$1,200 towards the furnace if the client agrees to pay the remaining \$800. The agency is required to use the maximum amount of allowable expenditure towards the cost of the furnace.

If the existing furnace does not meet replacement guidelines, the agency may advance to the next measure. This is the only instance that it is allowable to advance to the next measure without completing the one before, except in the case that a non-mobile home approved water heater is present in the building. See the [4.6 Health and Safety Measures](#) for guidance related to water heaters.

- A. General guidelines for furnace replacement:
  - i. Replace furnaces that have a standing-pilot with a high efficiency furnace.
  - ii. Replace furnaces with a calculated combustion efficiency of 80% or less with a high efficiency furnace.
    - a. To calculate the combustion efficiency take the output BTU/HR divided by the input BTU/HR.
  - iii. Ensure the furnace cabinet has enough clearance for the installation of the new furnace.

## 4.3 Duct Sealing

The time cap for duct sealing is 3 labor hours.

An agency shall deduct its average cost for duct sealing from the allowable expenditure.

All items listed below must be effectively addressed within the time allotment provided to perform duct sealing. If unable to effectively address all items listed below, the job shall not advance past the previous measure.

- A. General guidelines for duct sealing:
  - i. Limit duct sealing to a maximum of 3 total labor-hours.
  - ii. Limit duct sealing to the major leakage points of a mobile-home duct system:
    - a. Boots
    - b. Plenum
    - c. Ends
    - d. Crossovers

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- iii. Major holes in the ductwork may be sealed while still addressing the items listed above within the time cap.
- iv. If visual inspection indicates that these areas do not require sealing, then don't seal them.

### 4.4 Air Sealing (Pre-Set Cost Cap)

The cost cap for air sealing is \$450.

All items listed below must be effectively addressed within the cost and time allotment provided to perform air sealing. If unable to effectively address all items listed below, the job shall not advance past the previous measure.

A. General guidelines for air sealing:

- i. Limited to 3 total labor-hours or \$450, whichever comes first.
- ii. Only perform non-guided air sealing.
  - a. WCEG is omitted for mobile homes.
- iii. Limit air sealing to the typical major leakage points of the mobile home's pressure boundary:
  - a. Underneath sinks
  - b. Above the furnace and water heater
  - c. Around the electrical box
  - d. Around kitchen range-hood exhaust

If visual inspection indicates that these areas do not require sealing, then don't seal them.

### 4.5 Limited Belly Insulation (Pre-Set Cost Cap)

The cost cap for limited belly insulation is \$500.

An agency must be able to effectively address all items listed below within the cost cap in order to perform limited belly insulation. If unable to complete all items, the job will not be allowed to advance past the previous measure.

When more than 20% of the belly is in need of repair defer services. Contact the Energy Help Desk at [heat@wisconsin.gov](mailto:heat@wisconsin.gov) if an agency thinks they can complete in a cost effective manner. Example being on a 980sqft belly, it is only allowed to patch up to 196sqft.

A. General guidelines for limited belly insulation

- i. Patch holes in the road barrier and insulate with fiberglass batting, intending to restore the belly to its original construction and integrity.
- ii. Focus only underneath water lines and other areas that need protection from the elements.

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## 4.6 Health and Safety Measures

Health and Safety measures should be addressed only on a case-by-case basis, with deferral of services always being an option. Below are examples of how to manage certain situations.

At all times the cost of Health and Safety measures shall be deducted from the allowable expenditure amount.

- A. Dryer venting
  - i. Vent dryers to the exterior per current Program Manual and Field Guide standards.
- B. Gas Leaks
  - i. Do not test for gas leaks; provide verbal client education about gas leaks and the way to detect them.
    - a. Refer client to utility company for more information.
- C. Plumbing Leaks
  - i. If found at audit, defer the building.
  - ii. If found during limited belly insulation, defer the unit in progress until the client has remedied the water leak.
- D. Existing Mold and Moisture
  - i. Auditor judgment of when to defer based on existing conditions.
    - a. Mold
    - b. Exhaust fans not working to address mold and high moisture problems
      - 1. Client is responsible for replacing exhaust fans
  - ii. Provide verbal client education on the proper use of existing bath fans.
  - iii. Page 2 of the [Health and Safety Checklist](#) shall be used to document the reason to defer based upon existing mold and moisture.
- E. Water heater is not mobile home approved
  - i. Document the situation and provide homeowner notification.
  - ii. Air Sealing is not allowed, continue with other measures as prescribed.

## 5. Inspection

Mobile homes completed with the Measures List are not required to be inspected. Crews and contractors shall photo document the work performed and receive necessary job completions signatures at the appropriate times.

- A. If contracted work is being performed after agency work is being performed. An agency may want to target job completions so that multiple job completion signatures can be attained on the same day.

## 6. Reporting

Report Natural Gas mobile homes as regular units. Ensure that only Measures List measures are being selected.

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Natural Gas mobile homes that are being deferred but will still receive the Baseload items will be reported as regular units. If the mobile home comes off of deferral contact the Energy Help Desk at [heat@wisconsin.gov](mailto:heat@wisconsin.gov) so that a re-work job can be created to account for the additional measures being completed.

### 7. Outreach

It is recommended that agencies develop a plan for outreach to help minimize the costs of auditing as well as ensure the successful weatherization of Natural Gas mobile homes within the measures list. Suggestions are listed below.

#### A. General guidelines for outreach

- Target mobile homes manufactured in the year 2000 and older
- Potentially better opportunity to move into higher pre-usage therm bins
- Target mobile homes that have electric water heaters
- Target mobile homes that have refrigerators and freezers manufactured prior to 2004
- Target mobile homes that have standing pilot furnaces